Drycleaner Site Profiles

Abe's Main Street Cleaners, Portland, OR

Site Description

Abe's Main Street Cleaners, an active facility located in a commercial area, has operated since the 1940s. The drycleaner used Stoddard solvent until the 1980s, and then converted to perchloroethylene (PCE). Complaints about dumping triggered an Oregon Department of Environmental Quality (DEQ) site inspection in 1992. The investigation revealed that the operator discharged wastewater from the dryer through a pipe into the subfloor of the building, and indicated elevated levels of PCE in the groundwater. The DEQ handles inspection and remediation for this site as part of its Orphan Site Account program. Although the DEQ has not yet selected the final remedy, the Soil Vapor Extraction (SVE) system has removed soil contamination and a groundwater extraction system is currently in place.

Site Hydrogeology

Depth to ground water: 15-20 ft. bgs.

Lithology/subsurface geology: Clayey silt and fine sand, 0-15 ft. bgs.
Sandy gravel, 15-45 ft. bgs. A basalt unit underlies the sandy gravel that serves as a controlling factor on the fate and transport of DNAPL at the site. Boring logs reveal that a slight depression or bowl may exist beneath the facility, which may then pond any NAPL.

Conductivity: 22-491 ft/day

Gradient: ~0.003 ft/ft (horizontal); 0.001-0.71 ft/ft (vertical) downward

Groundwater Contamination

Contaminants present: PCE, trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-DCE), trans-1,2-dichloroethylene (trans-DCE), and vinyl chloride (VC)

Highest contaminant concentrations: 2,600 µg/L (PCE), 530 µg/L (TCE), 3,000 µg/L (cis-DCE), 390 µg/L (trans-DCE, 33 µg/L (VC)

Deepest significant ground-water contamination: Not reported.

Plume size: Several hundred ft. long

DNAPLs present: Although no DNAPLs have been detected or observed at the site, extremely high concentrations of chlorinated compounds may indicate their

presence. Groundwater sampling events reveal PCE concentrations exceeding 7% saturation for pure-phase PCE.

Soil Contamination

Contaminants present: PCE

Highest Contaminant Concentrations: more than 1,000,000 µg/kg

Description of Remediation Scenario

Technologies Used:
Soil Vapor Extraction (SVE)
Pump and Treat
Groundwater Extraction

Cleanup goals: Interim Remedial Action Measures (IRAM) objectives include the containment and minimization of further migration of volatile organic compound contamination in soil and groundwater. The Oregon DEQ seeks to remove the contaminant mass from the source area and protect or mitigate threats to human health or the environment until it selects the final remedy. The Oregon soil cleanup level for PCE at sites not impacting groundwater is 0.3 mg/kg. DEQ will establish groundwater cleanup levels as part of the site-specific risk assessment process and consideration of beneficial uses. The risk assessment process focuses on indoor air pathway and the excavation work pathway.

Remediation technology or technologies used: SVE (soil); Groundwater Extraction (groundwater)

Why was technology or technologies selected: DEQ identified the SVE system as a feasible method because of its potential to reduce and control the migration of chlorinated solvents in the unsaturated soil zone beneath the building and easy implementability. (IRAMs are just used to get something "done" at a site while it is being fully investigated/evaluated.) DEQ chose the groundwater extraction system because it provided a means to conduct mass removal and prevent the groundwater contamination from migrating toward a local water bodies. Evaluation of "innovative" technologies was done at the time, but not enough work had been done to recommend use at this site.

Date Implemented: 1998

Final Remediation Design: The contractor installed the SVE system beneath a wood floor and in the alley behind the facility. The system has 4 soil vapor extraction wells. The groundwater extraction and treatment system consisted of two extraction wells, particulate filters to remove suspended solids, low-profile air stripped to remove contaminants, and carbon adsorption vessels in parallel to further treat the water effluent. The contractor then discharged treated water to a storm sewer under the NPDES permit exemption.

Results

The SVE and groundwater extraction methods have been effective thus far in reducing concentrations of PCE and daughter product contamination located outside the source area. The SVE system significantly reduced PCE soil concentrations. Concentrations decreased from approximately 2700 ppm to 69 ppm within five months. Contractors have removed approximately 229 pounds of chlorinated contaminants with the groundwater extraction system. PCE concentrations have ranged from 1.08-716 µg/L, TCE concentrations ranged from 1.37-115 µg/L, cis-DCE concentrations ranged from 1.15-277 µg/L, trans-DCE concentrations were detected at 2.40 µg/L, and VC concentrations ranged from 1.43-23.1 µg/L. Overall the PCE concentrations have demonstrated a consistent reduction trend with minor rebounding concentrations. Monitoring results have revealed the continued increase in daughter products cis-DCE and VC, though. PCE concentrations in the immediate source area have remained relatively constant since implementation of the IRAM. The treatment system has been 99% effective for removal of LNAPL, removed approximately 60 gal. of Stoddard solvent, and approximately 40 lbs. of chlorinated solvents. The air stripping method has been 94% effective in removing volatile organic compounds.

Contractors completed the SVE operation and are currently operating the groundwater extraction. The OR DEQ will continue to operate the groundwater extraction for an additional year or until the concentrations are below risk-based levels. The groundwater pump-and-treat operation has been taken off-line. OR DEQ is monitoring VOCs on a quarterly basis to determine whether concentrations will rebound. This information will be an important factor in determining the need for additional remediation. OR DEQ is considering in-situ chemical oxidation to further reduce VOC concentrations in the source area. OR DEQ will select a final remedy upon completion of the Risk Assessment and Feasibility Study.

Costs

Site assessment: $300,000

Design and implementation: $30,000 (SVE); $125,000 (Groundwater extraction)

O&M: $15,000 (per year)

Total costs:

Lessons Learned

1. Significant cost savings realized with NPDES permit discharge via Storm Sewer rather than via POTW and Sanitary.
2. UV screening of soil and groundwater samples proved an adequate field screening technique in the source area.
3. Limited geochemical sampling failed to indicate significant iron fouling by iron bacteria in the source area. Significant O & M costs are necessary to maintain the

groundwater treatment system.
4. Coincident petroleum contamination from adjacent petroleum sites have resulted in a fairly mature degradation plume off-site and downgradient of the property that may limit any additional off-site necessary (e.g. monitored natural attenuation).
5.
6.
7.
8.

Site Specific References

--

Contacts

Bruce Gilles, Project Manager
OR DEQ, Site Response
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987
800-452-4011
gilles.bruce.a@deq.state.or.us

Contractors:
Ecology and Environment, Inc.
333 SW Fifth Avenue
Portland, OR 97204
503-248-5600
Mark Ochnsner, Project Manager
MOchsner@ene.com

This profile last updated: November 16, 2001

Drycleaner Site Profiles

Donaldson's Drycleaners, --, WI

Site Description

The Donaldson's One Hour Cleaners is an active facility that operates in a primarily commercial area, and has historically used PCE as a drycleaning agent. Investigations conducted in 1994 revealed the presence of chlorinated solvents in local groundwater monitoring wells. Subsequent investigations suggest that Donaldson's released perchloroethylene (PCE) to the soil and groundwater through the disposal of filters behind the facility and from bulk PCE deliveries through the rear building entrance. The PCE migrated to the asphalt, which was in poor condition. The exact quantity of PCE released is unknown, but investigations have documented contamination of PCE and its breakdown products in the soil, groundwater and fractured bedrock.

Site Hydrogeology

Depth to ground water: 8-10 ft. bgs.

Lithology/subsurface geology: Top layer, asphalt and gravel.
Red-brown clay, grade-8 ft. bgs.
Some gravel, ground surface-bedrock.
Fractured dolomite bedrock, beginning about 8 ft. bgs.

Conductivity: 3.46 ft/day (bedrock) to 0.19 ft/day (clay)

Gradient: About 0.001 ft/ft.

Groundwater Contamination

Contaminants present: PCE, trichloroethylene (TCE), cis-1,2,dichloroethylene (cis-1,2-DCE), trans-1,2-DCE, vinyl chloride (VC), benzene, toluene.

Highest contaminant concentrations: 55,000 µg/L (PCE), 6,400 µg/L (TCE), 19,000 µg/L (cis-1,2-DCE), 130 µg/L (trans-1,2-DCE), 1,600 µg/L (VC), 7,500 µg/L (benzene), 22,000 µg/L (toluene)

Deepest significant ground-water contamination: About 45 ft. bgs.

Plume size: Not yet defined, but contamination confirmed in area about one block long and ½ block wide.

DNAPLs present: Not yet determined.

Soil Contamination

Contaminants present: PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, VC

Highest contaminant concentrations: 660,000 µ/kg (PCE); 1,200 µ/kg (TCE); 730 µ/kg (cis-1,2,-DCE); 41 µ/kg (trans-1,2-DCE); 390 µ/kg (VC)

Description of Remediation Scenario

Technologies Used:
Air Stripping
Removal
Soil Vapor Extraction (SVE)
Pump and Treat
Capping
Air Sparging

Cleanup goals: The remedial goals include the removal of as much of the source as possible, particularly at hot spots, allow natural attenuation to work on the residual plume, and implement institutional controls. The goal of the soil removal specifically was to remove primary source soil in excess of U.S. EPA generic soil screening levels based on ingestion and inhalation direct contact criteria and calculated saturated soil limits. Soil performance standards, such as asphalt or concrete barriers, will be used to address concentrations of chlorinated compounds in excess of EPA groundwater protection criteria remaining in soil at the site. Given the lateral extent of chlorinated compounds in groundwater, it may not be practical to remediate groundwater to below the state groundwater quality standards (NR 140 Wis. Adm. Code). A groundwater extraction system will likely be implemented to address contamination beyond the source area once contractors have a clearer understanding of the plume. The contractor will recommend case closure based on the risk of the remaining chlorinated compounds in groundwater and use of institutional controls, like groundwater use restrictions or GIS registration.

Remediation technology or technologies used: Excavation and Removal, Capping (soil)
Soil Vapor Extraction/Air Stripping, Pump and Treat (groundwater)

Why technology or technologies selected: Contractors viewed these technologies as the most effective, feasible methods to contain contaminant concentrations in clay and bedrock, and to inhibit further migration of chlorinated compounds in groundwater. The access limitations and hydraulic conductivity of clay also influenced this decision.

Final remediation design: Contractors excavated 59.62 tons of soil containing elevated chlorinated compounds and transported soil off-site for chemical treatment and landfill disposal. The primary source area was capped with asphalt to meet soil performance standards. Contractors installed an SVE unit from a leaking Underground Storage Tank site, connecting the SVE blower to a common

well via PVC piping. Liquid collected in the vapor liquid separator is pumped to the air stripper. SVE and air stripper exhausts are connected and vented to the atmosphere. The groundwater in the source area, the area of highest contamination, is pumped from a well to a diffused-air-type (multi-stage), shallow tray air stripper for treatment. Treated water is disposed of in local storm sewer system under a Wisconsin Point Source Discharge Permit (WPDES).

Results

Contractors removed 59.62 tons of soil. Soil removal extended to a depth of about 7 ft. bgs. Contractors backfilled and compacted the excavation site with clean sand to about 4 ft. bgs., followed by clay to 0.5 ft. bgs. The clay was placed on the site to limit infiltration of surface water into the source area. Contractor placed about 4 in. of crushed limestone on the clay to restore the excavation surface and to provide a base course for an asphalt cap. Resulting concentrations are not yet available.

The dual extraction system (SVE and groundwater extraction) has operated for a brief time period, and initial results have demonstrated success so far. The system has removed about 1 lb. of chlorinated solvents per hour. Rush analysis of treated water revealed PCE concentrations of 3 µg/L, with a discharge limit of 50 µg/L. Another rush sampling event revealed PCE concentration of 10 µg/L, and cis-1,2-DCE concentration of 0.53 µg/L.

Although the residual plume appears to have pulled away from the water table downgradient from the source area, significant contamination remains at the water table in the source area. Bedrock fracturing has likely enhanced the vertical and lateral migration of the chlorinated compounds. Contractors will continue to delineate the horizontal and vertical extent of the contaminant plume while remediation occurs.

Conducting quarterly groundwater monitoring events to evaluate the effect of the soil removal and groundwater extraction on groundwater quality. Contractors will likely operate the groundwater system for a minimum of two years. Contractors anticipate that the removal of highly contaminated soil and groundwater in the source area will allow the remaining off-site contamination to naturally degrade. Groundwater monitoring will document natural attenuation of off-site contamination.

Costs

Site assessment: $32,330.67 (soil); $57,609.16 (groundwater). Remaining investigation activities are expected to cost approximately $5,000.00.

Design and implementation: $54,859.10 (soil); $36,460.50 (groundwater), including SVE)

O&M: About $40,000 over two years

Total costs:

Lessons Learned

1. The significant cost savings realized by installing used SVE equipment. The treatment system building, air stripper, transfer pump, heater, control panel, exhaust fan, and a portion of the piping were obtained from a leaking UST site. A new submersible pump was purchased, however, to ensure reliability.
2. Limited access and space severely restricted remediation options. There is also a lack of good technologies to remediate chlorinated compounds in clay. Contractors had initially ruled out SVE as an option because of clay's low hydraulic conductivity value, but further analysis revealed SVE's potential at the site. A DNR engineer indicated that the dewatering that would occur from groundwater pumping could release some free product from the groundwater at the capillary fringe and in the rubble zone immediately above the bedrock.
3.
4.
5.
6.
7.
8.

Site Specific References

--

Contacts

Jennifer Tobias, Hydrogeologist
Bureau for Remediation and Redevelopment
WI Department of Natural Resources
625 E. County Road Y, Suite 700
Oshkosh, WI 54901-9731
920-424-7887
tobiaj@dnr.state.wi.us

Contractors:
Mark A. Foht, Project Manager
Northern Environmental Technologies, Inc.
954 Circle Drive
Green Bay, WI 54304
920-592-8400
mfoht@northern-env.com

This profile last updated: November 26, 2001

Drycleaner Site Profiles

Dry Clean USA, Orlando, FL

Site Description

Dry Clean USA (DC USA) is an inactive drycleaning facility in Orlando that used perchloroethylene (PCE) and operated from 1988 to 1998. The site is located in a shopping center complex. Another drycleaning operation, located in the same shopping center approximately 65 east of the DC USA facility, operated from 1957 to 1988. Three public water supply wells are located within a one-mile radius. The shopping center was served by a septic system until the early 1970s.

Soil sampling shows that the contaminant source areas appear to be the soil beneath the building floor slab where the drycleaning machine was formerly located and the sanitary sewer lateral line.

Site Hydrogeology

Depth to ground water (bgs): 8-10 ft bgs

Lithology/subsurface geology:
Slightly silty, fine to medium-grained quartz sands, surface-47 ft bgs
Slightly sandy clay, 47-53 ft bgs
Fine to medium-grained sand interbedded with clayey sand, 53-83 ft bgs
Sandy, clayey, silt, 83-89 ft bgs
Fine to coarse-grained sand with shell fragments, 89-93 ft bgs
Hard phosphatic limestone 93-94 ft bgs

Conductivity (ft/day):
Surficial (8-47 ft bgs): 1.4 - 2.4 ft/day
Intermediate(47-93 ft bgs): 0.4 ft/day

Gradient (ft/ft): Surficial: 0.002 ft/ft

Groundwater Contamination

Contaminants present: PCE, 1,1 dichloroethylene (1,1-DCE), 1,1 dichloroethane (1,1-DCA), vinyl chloride (VC)

Highest contaminant concentrations: 2,380 µg/L (PCE), 700 µg/L (1,1-DCE), 67 µg/L (1,1-DCA)
98 µg/L (VC)

Deepest significant ground-water contamination:
68 ft bgs

Plume size: 800 ft x 300 ft (as defined by MCLs)

DNAPLs present: PCE concentrations in groundwater samples indicated that residual DNAPL may be present.

Soil Contamination

Contaminants present: PCE

Highest contaminant concentrations: 3.9 mg/kg (PCE)

Description of Remediation Scenario

Technologies Used:
Natural Attenuation
Pump and Treat
Soil Vapor Extraction (SVE)
Air Stripping
Groundwater Extraction
Infiltration

Cleanup goals: Maximum Contaminant Levels (Groundwater - MCLs) PCE = 3.0 mg/L, 1,1-DCE= 7.0 ug/L, 1,1-DCA= 70 ug/L, VC = 1.0 mg/L. Soils - leachability levels - PCE = 30 mg/kg

Remediation technology or technologies used: Pump and treat technology, combined with Soil Vapor Extraction

Why technology or technologies selected: SVE, using horizontal wells was selected to remediate soil contamination because the contaminant source area was under the building floor slab and there was no room to install a conventional system inside or near the former facility. Pump & treat was selected to remediate groundwater because of the limited evidence of residual DNAPL in groundwater at the site. Groundwater remediation addressed the contaminant source area where contaminant concentrations exceed 100 ppb.

Date implemented: April 1999

Final remediation design: The pump and treat system operated from April 1999 to January 2001. Design specifications are as follows:

	Design	Actual
Flow rate:	7 gpm	10 to 12 gpm
Recovery wells:	1	

Depth: 26 feet
Treatment: Air stripper; effluent discharged to infiltration gallery

The SVE system operated from April 1999 to December 2000. Design specifications are as follows:

Design Actual
Flow rate at blower: 400 scfm 400-460 scfm
Vacuum at blower: 24 in. w.c. 19-20 in. w.c.
Flow rate at wells: 200 scfm 220-270 scfm
Vacuum at wells: 18 in. w.c. 20 in. w.c.
Area of influence: 130 feet
Screen interval: 100 feet
Extraction wells 2 (horizontal)
Depth: 5 feet bgs

Groundwater samples have been collected at system start-up and quarterly thereafter to monitor site rehabilitation, as well as natural attenuation in the lower surficial and intermediate aquifers. Air stripper influent samples were collected monthly for the first six months, and quarterly thereafter. Effluent samples were collected daily for the first three days, monthly for the next two months, and quarterly thereafter. Soil vapor samples were collected weekly for the first month, monthly for the next two months, and quarterly thereafter.

Results

The groundwater active remediation goal of 100 mg/L has been attained. PCE concentrations remain above the MCL at two wells (5.4 mg/L and 3.8 mg/L). Soil sample VOC concentrations no longer exceed the CTL's for leaching, as outlined above.

Both the SVE and pump & treat systems have been deactivated. Contaminant concentrations in groundwater levels slightly exceed the state's No Further Action Criteria required for site closure. Groundwater monitoring will continue until those levels are achieved.

Costs

Site assessment: $ 97,724.36

Design and implementation: Design, pilot test-$ 33,189.06, Construction-$142,998.48 (including $ 29,500 for horizontal SVE wells); Equipment-$ 38,369.00

O&M: $108,976.36 (including sampling)

Total costs (only completed sites): $421,257.26

Lessons Learned

1. Numerical groundwater modeling was very valuable in siting the recovery well on location.

2. Horizontal SVE wells can be very effective for remediating contaminated soil beneath buildings.

3. Pump & treat was effective for what appeared be a limited residual DNAPL contamination.

4.
5.
6.
7.
8.

Site Specific References

IT Contamination Assessment Report-9/97
IT Remedial Action Plan-8/98
IT System Start-up Report and Record Drawings Submittal (Revised)-8/4/99
IT Remedial Action System Status Report-Year Two-Quarter Three-1/31/01

Contacts

Judie Kean, Site Project Manager
FDEP, Division of Waste Management, Bureau of Waste Cleanup, Hazardous Waste Cleanup Section
2600 Blair Stone Road, MS 4520,
Tallahassee, FL 32399-2400
(850) 488-0190
judie.kean@dep.state.fl.us

Contractor:
Kelly Bishop
International Technology Corporation
725 U. S. Hwy 301 South
Tampa, FL 33619
(813) 626-2336
kbishop@theitgroup.com

This profile last updated: November 26, 2001

Drycleaner Site Profiles

One Price Drycleaners, Sunrise, FL

Site Description

This is an active PCE drycleaning facility that has been operating since 1988. The facility is located in a mixed commercial/residential setting. A drainage canal is located approximately 75 feet southwest of the facility. The nearest public water supply well is located approximately 2000 feet southeast of the facility.

The contaminant source area is the soil beneath the building floor slab in the vicinity of the drycleaning machine.

Site Hydrogeology

Depth to ground water: 6-7 ft bgs

Lithology/subsurface geology: fine to medium-grained sand, surface - 3.5 ft bgs; limestone with medium-grained sand interbeds, 3.5 - 10 ft bgs; fine to coarse-grained sand with shells, 10 - 21 ft bgs; silty, fine to medium-grained sand with some silty clay, 21 - 29 ft bgs; limestone with medium-grained sand interbeds, 29 - 96 ft bgs.

Conductivity: 75 ft/day

Gradient: 0.003 ft/ft

Groundwater Contamination

Contaminants present: PCE, TCE, cis 1,2-DCE, 1,1-DCE, vinyl chloride

Highest contaminant concentrations: 2.8 ug/l PCE, 0.47 ug/l TCE, 97 ug/l cis 1,2-DCE, 1.98 ug/l 1,1-DCE, 41 ug/l vinyl chloride

Deepest significant ground-water contamination: 85 ft bgs

Plume size: 200 X 1000

DNAPLs present: There is no evidence of DNAPL in soil or groundwater.

Soil Contamination

Contaminants present: PCE

Highest contaminant concentrations: 5,300 μg/kg PCE

Description of Remediation Scenario

Cleanup Goals: Groundwater - MCLs: PCE = 3.0 µg/l, TCE = 3.0 µg/l, cis 1,2-DCE = 70 µg/l, 1,1-DCE = 7.0 µg/l, vinyl chloride = 1.0 µg/l

Soil: Cleanup target leachability standard: PCE = 30 ug/kg

Technologies Used:
Natural Attenuation
Soil Vapor Extraction (SVE)

Any other technologies used:

Why was technology or technologies selected: SVE is a cost effective technology for removing VOCs from permeable unsaturated soils. Natural attenuation with monitoring was selected as the groundwater remedy because groundwater contaminant concentrations were well below natural attenuation default concentrations.
Date Implemented: February 9, 2000

Final remediation design: Two SVE and two air inlet wells were installed beneath the building floor slab using hand augers. Piping from the wells extended to the ceiling of the facility where it was routed out the back of the building to the treatment compound.

Wells: 2 extraction, 2 air inlet
Depth: SVE-1 screened 0.5-6 ft bgs; SVE-2 screened 0.5-8 ft bgs; air inlet wells screened 0.5-3.5 ft bgs.
SVE motor size; 5.0 hp Rotron blower
Design flowrate: 100 cfm at design vacuum of 70 in. w.c.
Air inlet wells blower: 2.5 h.p. Rotron blower
Design flowrate: 60 cfm at design vacuum of 80 in. w.c.
Radius of influence: 80 ft
Emissions treatment: 200 lb. GAC canister

The system operated for 6 months - until August 9, 2000. For the first month of operation, all four wells, SVE and air inlet wells, were piped into the SVE system to reduce the possibility of inadvertent contamiant movement near the air inlet wells. In March of 2000, the air inlet wells were connected to the air inlet blower to eliminate any "dead zones" in the unsaturated zone.

Results

Confirmatory soil sampling indicated that contaminant concentrations in soils are below soil cleanup target levels. An estimated 6.8 lbs. of PCE was removed by the SVE system. Contaminant concentrations in groundwater samples collected from monitor wells were below cleanup target levels for two consecutive monitoring events. Criteria for No Further Action have been met at the site and remediation has been completed. A Site Rehabilitatioh Completion Order was issued for the site on July 2, 2001.

Costs

Site assessment: $144,500

Design and implementation: $45,500

O&M: $66,500

Site Restoration: $6,500

Total costs (only completed sites): $ 263,000

Lessons Learned

1. Local government agencies may require remediaiton equipment to be UL certified.
2. Installation of SVE wells inside the drycleaning facility is an option that should be considered.
3. Using air injection wells increases the pressure gradient and reduces the dead space between recovery wells, allowing for more efficient recovery of VOCs.

Site Specific References

Contamination Assessment Report 7/98
Remedial Action Plan 8/99
Remediaiton Performance Report 4/2000
SVE Summary Closure Report 11/2000

Contacts

Beth Walker, Project Manager
Bureau of Waste Cleanup, MS 4520
2600 Blair Stone Road
Tallahassee, Fl 32399-2400
850-488-0190
elizabeth.e.walker@dep.state.fl.us

Contractor: Richard E. Lewis, PhD, P.E.
HSA Environmental Engineers & Scientists
4019 East Fowler Avenue
Tampa, Fl 33617
rlewis@hsa-env.com

This profile last updated: February 18, 2002

Drycleaner Site Profiles

Sir Galloway Dry Cleaners, Miami, FL

Site Description

This is an active perchloroethylene (PCE) drycleaning facility that began operation in 1984. The facility was served by a septic tank until 1992. The facility is located in a mixed commercial/light industrial setting. A water supply well that serves as a potable water source for a business, is located approximately 270 ft north of the site.

The contaminant source is located beneath the building floor slab in the vicinity of the two drycleaning machines operated at the facility.

Site Hydrogeology

Depth to ground water: 8 ft bgs

Lithology/subsurface geology:
Fine to medium-grained sand, surface - 3 ft bgs;
Soft oolitic limestone, 3-10 ft bgs;
Very fine-grained sand, 10-28 ft bgs;
Fossiliferous limestone interbedded with medium-grained sand, 28-56 ft bgs

Conductivity: 75 ft/day

Gradient: 0.0003 ft/ft

Groundwater Contamination

Contaminants present: PCE, cis 1,2-DCE (dichloroethylene)

Highest contaminant concentrations: 26 µg/L (PCE)

Deepest significant ground water: 25 ft bgs

Plume size: 100 ft x 550 ft (defined to MCLs)

DNAPLs present: No evidence of the presence of DNAPLs

Soil Contamination

Contaminants present: PCE

Highest contaminant concentration: 1,400 µg/kg

Description of Remediation Scenario

Cleanup goals:
Groundwater MCLs: PCE = 3 µg/L; cis 1,2-DCE = 70 µg/L Soil cleanup target leachability standard: PCE = 30 µg/kg.

Technologies Used:
Natural Attenuation
Soil Vapor Extraction (SVE)

Any other technologies used: No

Why technology or technologies selected: The predominant portion of the contaminant mass was located in the unsaturated zone in permeable soils. SVE is a cost effective technology for removing VOCs from permeable unsaturated sediments.

Date Implemented: January 26, 2000

Final Remediation Design: The SVE system used two extraction wells and two air inlet wells. All four wells were installed beneath the building floor slab of the drycleaning facility in the area near the drycleaning machines. Piping for all the wells was run to the ceiling of the facility and was then routed to the rear of the building.

Depth (all wells): 6 ft beneath building floor slab
Screen interval: 1-6 ft below building floor slab
Blow (SVE wells): 5 hp, capacity: 120 cfm at design vacuum of 60 in. w.c.
Ultimate flow rate: 131 cfm at vacuum of 40 in. w.c.
Blower (air inlet wells): 2.5 hp, capacity: 80 cfm at design vacuum of 60 in. w.c.
Emissions treatment: 170 lb GAC canister
Radius of influence: SVE - 10 ft; air inlet well - 15 ft
System radius of influence: 20 ft

The system was operated for 6 months - until July 16, 2000. For the first five weeks of operation, all four wells (SVE & air inlet wells) were piped into the SVE system. Beginning in March, the air inlet blower was activated for the two air inlet wells. System performance was monitored by soil vapor samples collected weekly for the first month; monthly for the next two months; and quarterly thereafter.

The groundwater remedy at the site was natural attenuation with monitoring.

Results

Confirmatory soil sampling indicated that contaminant concentrations in soils are below cleanup target levels. The SVE system is estimated to have removed 5.73 lbs of VOCs from the subsurface. The SVE system has been decommissioned.

Contaminant concentrations in groundwater have been below groundwater cleanup target levels for the last two monitoring events. Criteria for No Further Action have been met at the site and remediation has been completed.

Costs

Site assessment: $105,065

Design and implementation: $48,800

O&M: $54,500

Total costs (only completed sites):

Lessons Learned

1. Installation of SVE wells inside the drycleaning facility is an option that should be considered. Data collected from contamination assessments conducted at 150 Florida drycleaning sites shows that the number-one source area is the drycleaning machines/stills (47.$% of identified contaminant sources).
2. Utilizing air injection wells increases the pressure gradient and reduces the dead space between recovery wells, allowing for more efficient recovery of VOCs.
3. Switching or alternating wells from vapor recovery to air injection alters the vapor flow paths in the subsurface resulting in improved recovery of VOCs.
4.
5.
6.
7.
8.

Site Specific References

Contamination Assessment Report - 8/97
Remedial Action Plan - 2/99
Remediation Performance Reports - April-August, 2000

Contacts

Beth Walker, Project Manager
Bureau of Waste Cleanup
Florida Department of Environmentle Protection
2600 Blair Stone Road, MS 4520
Tallahassee, Florida 32399-2400
850-488-0190
Elizabeth.e.Walker@dep.state.fl.us

Contractor:
Brian Moore
HSA Environmental Engineers & Scientists
4019 East Fowler Avenue
Tampa, Florida 33167

850-971-3882
bmoor@hsa-env.com

This profile last updated: January 18, 2002

Drycleaner Site Profiles

Stuart Cleaners & Tailors, Stuart, FL

Site Description

This is an active perchloroethylene (PCE) drycleaning facility that began operation in 1978. The facility is located in a stand-alone building in a mixed commercial/residential setting. A small creek, which drains to the Indian River Lagoon is located approximately 100 ft north and hydraulically downgradient of the facility.

The contaminant source area at the site is near the rear door (service entrance) of the facility.

Site Hydrogeology

Depth to ground water: 5 ft bgs

Lithology/subsurface geology:
Fine-grained sand, clay lenses, surface - 4 ft bgs; Peat & fine-grained sand - 4-5 ft bgs;
Fine-grained sand, clay lenses and peat - 5-13 ft bgs; Fine-grained sand, 13-36 ft bgs;
Fine-grained sand & coquina, 36-42 ft bgs.

Conductivity: 20.2 ft/day
Gradient: 0.0069 ft/ft

Groundwater Contamination

Contaminants present: PCE, trichloroethylene (TCE), dichloroethylene (cis 1,2-DCE), vinyl chloride

Highest contaminant concentrations: 1,600 ug/L (PCE) (direct push)

Deepest significant ground-water contamination: 20 ft bgs

Plume size: 120 ft x 130 ft bgs

DNAPLs present:

Soil Contamination

Contaminants present: PCE

Highest contaminant concentrations: 3,300 µg/kg (PCE)

Description of Remediation Scenario

Cleanup goals: Groundwater (MCLs): PCE = 3 µg/l; TCE = 3 µg/l; cis 1,2-DCE = 70 µg/l; vinyl chloride = 1 µg/l
Soils (Cleanup target leachability standard): PCE - 30 µg/kg

Technologies Used:
Removal
Soil Vapor Extraction (SVE)

Any other technologies used:

Why was technology or technologies selected: SVE is a cost-effective technology for removing volatile organic compounds (VOCs) from permeable, unsaturated soils.

Date Implemented: January 11, 2000

Final Remediation Design: The soil vapor extraction (SVE) system utilized 14 horizontal extraction wells, four vertical vapor-inlet wells, and one horizontal vapor-inlet well. SVE wells were installed in the parking lot at the rear of the facility (service entrance) and outside the west wall of the facility. The four vertical vapor-inlet wells were installed through the facility floor slab and the horizontal vapor-inlet well was installed outside the east wall of the building.

Depth: SVE wells 3 ft bgs; vapor-inlet wells 3 ft bgs
Screen intervals 15-35 ft
Radius of influence: > 8 ft
Blower: 10 hp capacity, 300 cfm at design vacuum of 70 in. w.c.
Flow rate: 289 cfm at vacuum of 28 in. w.c.
Emissions treatment: 2 - 400 lb granular activated carbon (GAC) canisters

The system operated for five and one-half months and was shut down on July 25, 2000.

Results

Confirmatory soil sampling showed that the contaminant concentrations in soils were below soil cleanup target leachability levels. The SVE system is estimated to have removed 1.64 lbs of VOCs. Approximately 236 tons of soil were excavated during SVE System intallation. An estimated 0.55 lbs of PCE was contained in the excavated soil. The SVE system has been decomissioned.

The last two groundwater monitoring events, conducted in April and August 2000, did not detect any contaminants in groundwater in concentrations exceeding regulatory MCLs. A Site Rehabilitation Completion Order has been issued for this facility.

Costs

Site assessment: $62,622

Design and implementation: $159,717

O&M: $25,564

System Close Out & Site Rehabilitation: $15,939

Total costs (only completed sites): $266,163

Lessons Learned

1. Since the contaminant mass was situated in the unsaturated zone and the shallow portion of the water table, it is believed that a substantial portion of the mass was remediated during the trenching and subsequent soil removal for installation of the horizontal SVE wells.

Site Specific References

Contamination Assessment Report - 11/3/97
Remedial Action Plan - 7/2/99
Remedial Action Report - 2/14/2000
Operation & Maintenance Reports - 4/200 & 10/2000

Contacts

John Sykes, Project Manager
Bureau of Waste Cleanup, MS 4520
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
John.Sykes@dep.state.fl.us

Contractor
John McGovern, Contract Manager
Foster Wheeler Environmental Corporation
759 South Federal Highway, Suite 100
Stuart, Florida 34994-3411
jmcgovern@fwenc.com

This profile last updated: January 23, 2002

Drycleaner Site Profiles

The Dry Cleaner, Altamonte Springs, FL

Site Description

This an inactive PCE drycleaning facility that operated from 1990 to 1998. It is located in a strip mall adjacent to a residential neighborhood. Most of the residences obtain drinking water from private wells completed in the Floridan aquifer at depths as shallow as 95 feet bgs. The nearest municipal water supply well is located within a half mile of the site. The contaminant source area was located in the soil beneath the building floor slab in the vicinity of the drycleaning machine.

Site Hydrogeology

Depth to ground water (bgs): 48 ft bgs

Lithology/subsurface geology: Slightly silty, fine to medium-grained quartz sands with lenses of clayey sand, surface-38 ft bgs
Slightly sandy, phosphatic clay interbedded with white, fossilliferous, sandy limestone, 38-61 ft bgs
Sandy clay and clayey sand, 61-95 ft bgs.
Fossiliferous limestone, 95-130 ft bgs

Conductivity (ft/day): 2.3 ft/day (upper surficial); 0.2 ft/day (lower surficial); 7.9 ft/day (upper Floridan)

Gradient (ft/ft): 0.002 ft/ft (upper surficial)

Groundwater Contamination

Contaminants present: PCE, TCE

Highest contaminant concentrations: 7.2 µg/L (PCE), 1 µg/L (TCE)

Deepest significant ground-water contamination: PCE at 80 ft bgs

Plume size: 100 ft. x 80 ft. (defined to MCLs)

DNAPLs present: No evidence of the presence of DNAPL

Soil Contamination

Contaminants present: PCE

Highest contaminant concentrations: PCE - 91,700 µg/kg

Description of Remediation Scenario

Technologies Used:
Soil Vapor Extraction (SVE)

Cleanup goals: Cleanup goals: Maximum Contaminant Levels (Groundwater - MCLs) PCE = 3.0 mg/L, TCE = 3.0 mg/L.
Soils - leachability level - PCE = 30 mg/kg

Remediation technology or technologies used: Soil Vapor Extraction (SVE)

Why was technology or technologies selected: The predominant portion of the contaminant mass was located in the unsaturated zone at the site in sandy soils. The depth to water at the site was relatively deep.

Date Implemented: March 1999

Final Remediation Scenario: The SVE system operated for approximately six months with one extraction well using the following design:

Depth: 40 ft bgs
Screened interval: 10-40 ft bgs
Motor size: 3 hp
Capacity: 147 scfm (at design vacuum of 66 in. w.c.)
Ultimate flow rate: 160 scfm (at zero vacuum); 50 cfm (at 190 in. w.c.)
Emissions treatment: Two 200 lb. GAC canisters

System performance was monitored by soil vapor samples collected weekly for the first month, monthly for the next two months, and quarterly thereafter. Site rehabilitation progress was monitored by groundwater samples collected at system start-up and quarterly thereafter.

Results

Confirmatory soil sampling indicates that contaminant concentrations were below FDEP SCTLs. Additionally, with the exception of 10 mg/kg of PCE at a depth of one foot at one soil boring, all VOC concentrations were below laboratory detection limits. At the time of final monthly sampling the system had removed a total mass of 3.77 pounds of VOCs from the subsurface soils.

PCE concentrations in groundwater samples decreased to below CTLs. In addition, the most recent laboratory analyses indicated that contaminant concentrations were all below CTLs and laboratory detection limits for all monitor wells.

Remediation is complete. Criteria for No Further Action have been met. The Site Rehabilitation Completion Order has been filed and the site closed.

Costs

Site assessment: $105,875.03

Design and implementation: $ 77,779.22 (SVE system was put into a trailer for use at other drycleaning sites.)

O&M: $ 44,544.02

Total costs (only completed sites): $228,198.27

Lessons Learned

1. SVE can remediate the vadose zone in a relatively short time period.
2. Project was successful due to comprehensive data collection during site assessment work and application of an appropriate remedial technology.
3.
4.
5.
6.
7.
8.

Site Specific References

1. IT Contamination Assessment Report-7/97
2. IT Remedial Action Plan-11/98
3. IT Site Rehabilitation Completion Report-1/00

Contacts

Judie Kean, Site Project Manager
Florida Department of Environmental Protection
(850) 488-0190
judie.kean@dep.state.fl.us

Contractor:
Kelly Bishop
International Technology Corporation
(813) 626-2336
kbishop@theitgroup.com

This profile last updated: December 10, 2001